Final Report

Estimating Additional Water Yield From Changes in Management of National Forests in the North Platte Basin

Submitted by

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EXECUTIVE SUMMARY

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The Platte River EIS is examining alternative approaches to improving river flows in the Central Platte River for four threatened and endangered species (target species). Many different approaches to increasing basin storage of waters, management of waters, and retiming of river flows are being examined. Among the alternatives suggested during the scoping process is the concept of increasing the timber harvest on National Forests in the headwaters of the Platte River as a means of augmenting the water supply. This study is undertaken to provide a reconnaissance-level analysis of the water yield that might be expected from such an action as well as the current impact of past management activity.

In order for increased runoff from the National Forest to lead to improved Central Platte River flows for the target species, some fraction of the additional flows must be captured and allocated to the Recovery Program. The most likely means for this is capture and storage in a Federally operated reservoir. Due to the number of Federal reservoirs on the North Platte, as well as their relative proximity to the North Platte headwaters, it appears that focusing this study on the North Platte forests is a good test of the viability of this concept.

Several issues stand out as a result of this analysis. First, and perhaps most interesting is the magnitude of the simulated decrease in flow that has occurred over the last 140 years due to vegetative growth; a decrease of 185,000 acre-feet or more of water from 1,107,000 acres of NFS land.

Water yield from NFS lands on the North Platte is in general quite high because of the high precipitation input. Although the percentage of forestland Suitable for Timber Harvest is less than 50 percent of the total NFS lands, sizable increases in flow appear feasible using the 120-year rotation and appropriate silvicultural techniques for each forest type with lodgepole pine and spruce-fir being the most prevalent. Simulations indicate that water yield can be increased by 37,000 acre-feet per year by 2015 with a

gradual increase, through the rotation, to sustainable 50 – 55,000 acre-feet of water per year.
In general, the simulated trends in stream flow whether the result of historical in-growth, simulated harvesting, or catastrophe appear consistent with observed changes measured at the streamgage for treatments with a comparable impact. The hydrologic model WRENSS appeared to perform well when simulating the effects of fire, insect mortality, and timber harvest. Simulations of hydrologic response to both clear cutting and partial cutting compare well with observed changes in flow measured at the stream gauge, for similar impacts.

It would seem unlikely that the simulated changes in flow following timer harvest simulations would be detectable at any streamgage on the North Platte River. Neither is it likely that the simulated increases in flow could actually be detected as they exit NFS land, assuming a gauge were present to monitor them.

It is conceivable that decreases in flow on the order of magnitude simulated for the historical trend in forest cover could be detected downstream at a USGS gauge, if the gauge had an adequately long and consistent record. Since most gauges (North Platte at Northgate and Mitchell, North Platte below Whalen, etc.) were not initiated until the early 1900's, thus making detection of the flow reduction, as simulated, questionable.

Although we chose not to simulate the potential response to other management scenarios, one can infer the relative impact of adding or subtracting Suitable acres based on simulated responses for the acreage currently available. One can also infer the impact of fully or partially implementing the management alternatives or a modification of them. Costs, in terms of water yield, can also be calculated as opportunity forgone for exclusions for Wilderness, wildlife set asides, and so on. To the degree the data set provided to us properly characterizes the vegetation, the historical trend simulations are indicative of the cost, in water, of allowing vegetation density to increase. Although we did not specifically address peak flows and low flows, we would expect the nature of the simulated responses to fall within the frequencies and distributions observed on experimental watersheds. Except following fire at lower elevations (5 – 7,000 feet), we would not expect peaks or low flows to be altered.